Passiflora tina spec. nov., a new species of *Passiflora*, subgenus *Astrophea* (Passifloraceae) from Ecuador

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Abstract:
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A new species of *Passiflora* is described from northwestern Ecuador. *Passiflora tina* R.Boender & T.Ulmer is characterized by its flowers grouped in dense fascicles, the wavy outer corona filaments surrounding the androgynophore in a campanulate fashion, the deeply cleft operculum, and the structure and length of the inner corona series. The new species is somewhat intermediate between different sections of subgenus *Astrophea* and thus questions the current classification. It most closely resembles *P. callistemma, P. maguirei* and *P. pittieri*. The differences between the four species are discussed.

Zusammenfassung:
Mit *Passiflora tina* wird eine neue Art der Untergattung *Astrophea* aus dem nordwestlichen Ecuador vorgestellt. Damit hat sich die Anzahl der in Ecuador beheimateten Vertreter der Untergattung *Astrophea* seit 1988 mehr als verdoppelt. Charakteristisch für *Passiflora tina* sind im wesentlichen die vielblumigen Blütenstände und die Struktur der äußeren Strahlenkranzreihe. Diese neue Art ist besonders eng mit *P. pittieri* verwandt und wurde zeitweise auch für diese gehalten. Eine Unterscheidung beider ist jedoch leicht möglich. Während *P. tina* einen aufrechten, glockenförmigen Strahlenkranz aufweist, liegt dieser bei *P. pittieri* hernieder. Darüber hinaus bieten die Anzahl der Elemente der äußeren Strahlenkranzreihe sowie die Menge der Blüten per Nodium eine gute Unterscheidungsmöglichkeit. Weitere verwandte Arten sind *P. callistemma* und *P. maguirei*. Von beiden kann *P. tina* mit Hilfe ihres 5-reihigen Strahlenkranzes, des breiteren Blütenkelches, sowie der im oberen Drittel stark verbreiterten Strahlenkranzelemente unterschieden werden.

Introduction

During various trips to Tinalandia, a pre-montane rain forest site on the western slope of the Andes in northwestern Ecuador, the senior author worked on the life history of *Heliconius sapho candidus* Brown (in press). This spectacular butterfly was previously very common. Its host plant and that of a closely related butterfly, *Heliconius eleuchia primularis* Butler, was in Ecuador listed as *Passiflora macrophylla* Spruce ex Mast. by BENSEN et al. (1976).

Both species of butterflies mate while the female is still in the pupal stage. These closely related species would be in competition for the same host and therefore a second host passion vine had to exist in the area, probably *P. pittieri* Mast. or something similar (Gilbert, pers. comm.). The widespread neotropical *H. sapho* feeds on *P. pittieri* in Central America.

During the 15th trip to Tinalandia in 1996, *Heliconius sapho candidus* was observed leaving a nectaring flower and circle a small area a number of times as if there were a host plant and then fly away. A search of the location revealed 3 small juvenile treelets of *P. tina*. They were growing in pre-montane rain forest on a north facing slope of about 35 to 40 degrees. The site was remarkably rich in litter of 10–15 cm deep, and the soil is typical laterite.

In culture, the treelets turned into climbing vines with well developed tendrils, which bloom about 2–3 times per year from old wood on shady parts of the plant. Remarkable is the extreme amount of nectar and the very nice odor of the flowers.

A careful examination of its characteristics and a comparison with other *Astrophea* species revealed *P. tina* differs from its close relatives, *P. callistemma* Escobar, *P. maguirei* Killip and *P. pittieri* Mast., in many characters and should be regarded as an independent species.

Passiflora tina R.Boender & T.Ulmer, spec. nov.

Type: Ecuador. Prov. Pichincha, Tinalandia, southeast of Santo Domingo de las Colorados on road to Alluriquín, 700 m, 6 May 1996, *R. Boender 744* (holotype QCA; isotype M).

Species haec in subg. Astrophea pertinens; liana; ubique ovario excepto glaberrima; petioli 0,9–1,9 cm longi; laminae foliorum integrae, oblongae, oblongae-ovatae, 7,5–30 cm longae, 3,5–10 cm latae; flores fasciculati, 6–7,5 cm diametro; coronae filamenta 5-seriata, filamentis exterioribus 2–2,8 cm longis; operculum tubulosum, erectum, supra medium irreguliter laciniatum. *Passiflora callistemma, P. maguirei* et *P. pittieri* affinis sunt.

Treelet turning into woody vine up to 9 m tall, with well developed tendrils on younger stems, glabrous throughout with exception of ovary and styles; stem terete, brown, younger parts green; stipules setaceous, 0.1–0.2 cm long, soon deciduous; petioles 0.9–1.5(–1.9) cm long, 2-glandular at junction to midrib of blade, with sessile oval nectaries ca. 0.2 cm long and 0.1 cm wide; leaves entire, oblong to oblong-ovate, (7.5–)12.5–25(–35) cm long, (3.5–)5–9(–13.5) cm wide, acute or abruptly acuminate at apex, cuneate or rounded at base, with 9–12 pairs of major lateral veins, subcoriaceous, drying olive-green; peduncles grouped in dense fascicles on old stems, 0.5–0.7 cm long; bracts subulate, 0.2–0.3 cm long; flowers 3.5–5.5 cm long, 6–7.5 cm in diameter, white with rose to purplish-brown and yellow corona; floral stipe 0.4–0.6 cm long, up to 0.3 cm in diameter; floral tube (hypanthium) cylindrical to campanulate-cylindrical, 0.8–1.2 cm long, 1–1.5 cm wide at apex, tapering towards base; sepals oblong, 2.9–4.1 cm long, 0.8–1.3 cm wide, outside green with fine darker lines, inside white tinged greenish on the edges, obtuse, fleshy; petals oblong, nearly as long as the sepals, 1–1.5 cm wide, white, membranaceous; corona in 5 series, outer series curved, forming a campanulate structure around the androgynophore, filaments of outer series (44–)47–53, laterally compressed, wavy, creme at base, purplish-orange to purplish-brown above middle and yellow at the apex, (2–)2.3–2.8 cm long, 0.2 cm wide at base, abruptly dilated in upper third, 0.4 cm wide, tapering to apex, ca. 0.1 cm wide, filaments of second series laterally compressed, 0.9–1.3 cm long, dilated up to 0.2 cm near apex, creme to yellow at base, tinged more and more purple above middle, those of third series laterally compressed, 0.6–0.8 cm long, about 0.1 cm wide, purplish-orange to purplish-brown, those of fourth series filiform, about 1cm long, inserted inside the hypanthium, curled in lower third, erect in upper half, those of inner series narrowly linear, about 0.5 cm long, placed 0.3 cm above base of oper-

culum; operculum inserted slightly above middle of hypanthium, tubular, erect, exserted above apex of hypanthium, irregulary cleft in upper half, 1–1.5 cm long, reddish; androgynophore 3–3.5 cm long, reddish; ovary ovoid, ca. 0.5 cm long, ca. 0.3 cm wide, densely pubescent; styles ca. 1 cm long and 0.2 cm wide, densely pubescent; fruit unknown.

Additional collection examined:

Ecuador. Prov. Esmeraldas: Bilsa Reserve, Green Trail, Station 35, 559 m, 6 Aug 1998, *D.D. Kapan & S. Delgados 125* (TEX).

Taxonomic remarks

Passiflora tina belongs to the subgenus *Astrophea,* but it does not fit well into any of the six sections given by KILLIP (1938) and taken on by ESCOBAR (1994). The new species is intermediate between the sections *Dolichostemma* Killip (exserted, tubular operculum), *Pseudoastrophea* (Harms) Killip (morphology of the flowers, especially the corona) and *Botryastrophea* (Harms) Killip (flowers in dense fascicles, cauliflorous) and thus questions the current classification. KILLIP (1948) mentioned the same problems with *P. maguirei*, which he placed next to *P. deficiens* Mast. of section *Pseudoastrophea*. ESCOBAR (1994) described *P. callistemma* a species characterized by its white flowers in dense fascicles, a short hypanthium and an exserted operculum. She indicated that *P. callistemma* closely resembles *P. ovata* Martin ex DC of section *Pseudoastrophea*, which also has an tubular operculum. There is at least one more species of subgenus *Astrophea*, *P. haughtii* Killip, which has a tubular operculum around the androgynophore with its margin above apex of hypanthium.

On the basis of these findings, it seems to be necessary to question whether the long, tubular operculum should be regarded as a distinctive mark of section *Dolichostemma*. However, further studies are required to establish whether the current circumscription the sections are monophyletic entities. We are anxiously looking forward to the revision of this subgenus begun by Escobar and to be completed by Hansen in the near future.

Passiflora tina is closely related to *P. callistemma* from northwestern Colombia, *P. maguirei* from British Guiana, Brazil and probably Venezuela, and the widespread *P. pittieri* which is known from Belize, Costa Rica, Panama, Colombia and Venezuela. JØRGENSEN & MACDOUGAL (1997) mentioned that *P. pittieri* occurs also in Ecuador.

Using ESCOBAR's key to subgenus *Astrophea* (1994) it key out as *P. callistemma*. In the Flora of Ecuador HOLM-NIELSEN et. al. (1988) it does not fit in the key of subgenus *Astrophea*, because only four species not resembling *P. tina* were known. *P. tina* differs from *P. callistemma* and *P. maguirei* by having 5 corona series, a wider hypanthium and strongly dilated corona filaments of outer, second and third series. From *P. pittieri,* the new species can be distinguished by its flowers borne in dense fascicles, shorter peduncles, the wavy outer corona series which is forming a campanulate structure around the androgynophore, and the higher number of the strongly dilated outer corona filaments. The differences between the four species are summarized in Table 1.

Etymology

The epithet honors Tina Garzon who was born in Odessa. She fled the Russian Revolution in the early part of the 20th century and built the Tinalandia hotel located next to a small forest and an adjoining tract which are about the only forest left in this part of Ecuador. Tina recently died at about 88.

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Table 1. Comparison of *Passiflora tina* and its closest relatives.

Characteristics	*P. callistemma*	*P. maguirei*	*P. pittieri*	*P. tina*
Number of flowers/node	paired or grouped in fascicles, 2–8 flowers/node	grouped in dense fascicles, about 5 flowers/node	peduncles solitary, often bifurcate, usually 1–2 flowers/node	grouped in dense fascicles, 4–10 flowers/node
Length of peduncles including floral stipe	1.4–2.3 cm	1.6–2 cm	1.4–6.1 cm	0.9–1.3 cm
Hypanthium	cylindrical, ca. 0.9 cm long, ca. 0.6 cm wide	funnel shaped, 1.5–2 cm long, ca. 0.8 cm wide	cylindric-campanulate, 0.8–1 cm long, 0.6–0.7 cm wide	cylindrical to campanulate-cylindrical, 0.8–1.2 cm long, 1–1.5 cm wide at apex
Number of corona series	4	4	4–5	5
Outer corona series	wavy, surrounding the androgynophore in a campanulate fashion	probably not wavy, probably more or less flat	not wavy, more or less flat	wavy, surrounding the androgynophore in a campanulate fashion
Number, length and form of outer corona filaments	ca. 65, ca. 3 cm long, very slender	number unknown, 2–2,2 cm long, linear-dolabriform, 0.2 cm at widest point	28–37(–42), 1.5–2 cm long, sub-dolabriform, 0.2 cm at widest point	(44–)47–53, (2–)2.3–2.8 cm long, abruptly dilated in upper third, up to 0.4 cm at widest point
Filaments of second series	ca. 0.5 cm long, dilated at apex	ca. 1 cm long, narrowly linear	0.5–0.8 cm long, dilated, 0.1 cm wide at apex	0.9–1.3 cm long, dilated up to 0.2 cm near apex
Operculum	ca. 1 cm long	ca. 1.2 cm long, deeply cleft in upper half	ca. 1 cm long, minutely denticulate	1–1.5 cm long, deeply cleft in upper half

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Figure 1: a: Flowers of *Passiflora tina* R.Boender & T.Ulmer grouped in dense fascicles (*Boender 744*, cultivated); b: Flower, close up showing the corona series; c: *Heliconius sapho candidus* Brown.

Figure 2: Habit of *Passiflora tina*.

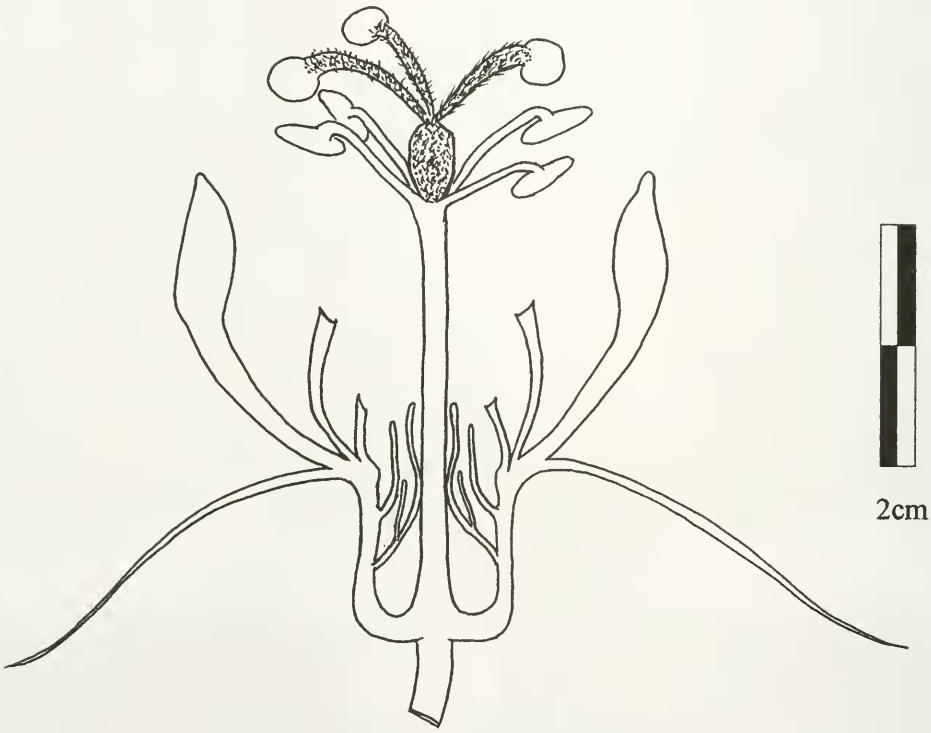

Figure 3: Schematic detail of longitudinal section through the flower of *Passiflora tina*.